

Ravi Vaidyanathan

Reader in Bio-Mechatronics

Department of Mechanical Engineering

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Career Synopsis

- Biomechatronics academic; research focus in hierarchical mechanisms of sensory-motor control with application mobile robots and cybernetics
- Director: [Biomechatronics Laboratory](#), Imperial College London (18 full-time researchers)
- Awarded 20+ research grants in the US, UK, and Singapore; £8 million+ in support
- Authored 40+ journal publications; 4 patents, 3000+ citations, H-index 24 (Google Scholar)
- Inventor on 5 pending patents; 4 spin-out companies founded from academic research; former holder of 2 industrial directorships
- Recipient of international accolades for research innovation from organizations including: IEEE Robotics and Automation Society, UK IET, UK NHS, SAGE Publishers, Robotics Society of Japan (RSJ), and American Institute of Aeronautics and Astronautics (AIAA)
- Research featured for impact in public press on 30+ occasions by groups including: New Scientist, the Discovery Channel, ITV News, Gadget Show, IEEE Spectrum, and the BBC

Selected Honours and Awards

- Featured Presenter: Prime Minister's Roundtable on British Technology** June 2018
Invited as 1 of 7 presenters 'showcasing top British Technology' at the Prime Minister's technology roundtable at 10 Downing Street, London
- Best Paper in Conference** March 2018
IEEE Int. Conference on Intelligent Systems Engineering (ICISE), Kuala Lumpur, Malaysia
- Featured Speaker: New Scientist Live** Event: Sept 2017
Featured speaker at science showcase, *New Scientist Live Festival* (30,000 attendees) for cybernetics
- Winner: UK Institute of Engineering Technology (IET) Award** Awarded: June 2016
"Most Promising Innovation in Robotics" (Robot Therapy for Parkinson's Disease)
- Finalist: UK Big Chip Digital Industry Award** Awarded June 2016
"Most Innovative Application of Technology" (Corner Smart Boxing System)
- Winner: Gadget of the Month, Wearable Technologies Magazine** Awarded March 2016
Wearables in combat sports
- Winner: UK National Health Service (NHS) Innovation Challenge** Awarded: Jan 2016
"Innovations for self-rehabilitation and monitoring of arm disability" (Team led by P. Bentley, MD)
- Finalist: Best Student Paper (Supervisor)** Awarded May 2015
IEEE International Conference on Computer Based Medical Systems (CBMS), New York, USA
"Pervasive motion tracking and muscle activity monitor"
- SAGE Best Paper Award** Awarded: May 2013
"Best Paper" (2012), *Journal of System and Control Engineering*, SAGE Publishers
First author: "Reflexive Control Based on a Neural Model of the Cockroach Escape Response"
- Winner: N-Power Energy Challenge (Faculty Advisor)** Awarded: June 2010
Faculty advisor to team winning first prize out of several hundred entrants in the UK and Germany; solution presented at UK Parliament June 2010
- New Technology Foundation Award on Robots and Systems** Awarded: Oct 2007
"Human Medical Assist based on Aural Flow"; sponsored by Robotics Society of Japan; awarded as one of the most innovative robotics worldwide from 1987-2007
- Best Paper in Conference** Awarded: Aug 2005
IEEE International Conference on Intelligent Robots and Systems (IROS), Sendai, Japan
First author: "Human-Machine Interface for Tele-Robotic Operation Based on Aural Flow"

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Selected Research Grants (taken from 20+ in total)

1. Principal Investigator, *Natural User Interface (NUI) for Assistive Technology*, UK Engineering and Physical Sciences Research Council (EPSRC) Impact Acceleration Account EP/R511547/1, April 2019-March 2020, £153,907
2. Co-Investigator, *Dementia Research Institute Care Research & Technology Programme*, UK Medical Research Council (MRC), Alzheimer's Society, and Alzheimer's Research UK, £20 million, June 2019-June 2025 (£1 million subcontract)
3. Principal Investigator, *Psychosocial Robot for Engagement with Dementia Patients Nations*, Research England Grand Challenge Research Fund (GCRF) and MedTech Superconductor, £167,049 Nov 2018-July 2019
4. Principal Investigator, *Mechanomyography Control of Lower Limb Prosthetics*, July 2017-June 2018, UK Medical Research Council and Ossur Inc., £180,000
5. Co-investigator, *Mechanical Muscle Activity with Real-time Kinematics (M-MARK)*, Nov 2015-Nov 2017, UK National Institute of Health Research (NIHR) grant II-LB-0814-20006, £1,080,000
6. Principal Investigator, *A Tele-Operative Sensory Motor Control Interface*, Oct 2014-Oct 2017, US Office of Naval Research Global (ONR-G) grant N62909-14-1-N221-P00002, \$375,000
7. Research Board Member, *Centre for Doctoral Training (CDT) in Neurotechnology*, UK Engineering and Physical Sciences Research Council (EPSRC), Oct 2013-Oct 2018, £10 million
8. Principal Investigator, *Robotic Instruments for Adaptive Neurostimulation and Interface with the Basal Ganglia*, Engineering and Physical Sciences Research Council (EPSRC) Centre for Doctoral Training (CDT) in Neurotechnology, £330,000, Oct 2016-Oct 2021

Selected Refereed Journal Publications (taken from 35+ in total)

1. S Wilson, H Eberle, Y Hayashi, S OH Madgwick, A McGregor, XJ Jing, R Vaidyanathan, "Formulation of a New Gradient Descent MARG Orientation Algorithm: Case Study in Robot Teleoperation", *Mechanical Systems and Signal Processing*, 130, 1, pp 183-200, 2019
2. RB Woodward, MJ Stokes, SJ Shefelbine, R Vaidyanathan, "Segmenting Mechanomyography Measures of Muscle Activity Phases Using Inertial Data", *Nature: Scientific Reports*, 9, 1, 5561, 1-10, 2019
3. A F Fadhil, R Kanneganti, L Gupta, H Eberle, R Vaidyanathan, "Fusion of enhanced and synthetic vision system images for runway and horizon detection", *Sensors*, 19, 17, 3802, 17 pp 2019
4. F Russell, Y Zhu, W Hey, R Vaidyanathan, P Ellison, "A novel biomimicking design for mechanical knee joints for improved mobility", *Bioinspiration and Biomimetics*, 13 056012, 1-12, 2018
5. J Lai, R Woodward, Y Alexandrov, QA Munnee, CC Lees, R Vaidyanathan, N C Nowlan, "Performance of a wearable acoustic system for fetal movement discrimination", *PLoS One*, 13(5): e0195728, 1-14, 2018
6. R Woodward, S Shefelbine, R Vaidyanathan, "Gait analysis using pervasive motion tracking and mechanomyography Fusion", *IEEE Transactions on Mechatronics*, 22,5, 2022-2033, 2017
7. J Burridge, A Lee, R Turk, M Stokes, J Whitall, R Vaidyanathan, P Clatworthy, A M Hughes, C Meagher, E Franco, L Yardley, "Tele-health, wearable sensors and the Internet: Will they improve stroke outcomes through increased intensity of therapy, motivation and adherence to rehabilitation programs?", *Journal of Neurologic Physical Therapy*, 41, S32-S38, 2017
8. K Mamun, M Mace, M Lutman, J Stein, X Liu, T Aziz, R Vaidyanathan, S Wang, "Movement decoding using neural synchronisation and inter-hemispheric connectivity from deep brain local field potentials", *Journal of Neural Engineering*, 12, 5, pp 1-18, 2015
9. R. Lock, R. Vaidyanathan, S.C. Burgess, "Multi-modal locomotion: from animal to application", *Bioinspiration and Biomimetics*, 9, pp 1-18, 2014
10. M Mace, K Abdullah-al-Mamun, A.A. Naeem, L Gupta, S. Wang, R. Vaidyanathan "A heterogeneous framework for real-time decoding of bioacoustic signals: Applications to assistive interfaces and prosthesis control", *Expert Systems with Applications*, 40, 13, pp 5049-5060, 2014